

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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Applicant's or agent's file reference PS3386WO	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/CZ2004/000056	International filing date (day/month/year) 08.09.2004	Priority date (day/month/year) 08.09.2003	
International Patent Classification (IPC) or national classification and IPC D01D5/00			
Applicant TECHNICKA UNIVERZITA V LIBERCI et al.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> <i>sent to the applicant and to the International Bureau</i> a total of 4 sheets, as follows:</p> <ul style="list-style-type: none"> <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. <p>b. <input type="checkbox"/> <i>(sent to the International Bureau only)</i> a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			

<p>4. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Box No. I Basis of the opinion <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application 	
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Date of submission of the demand 08.07.2005	Date of completion of this report 04.11.2005
Name and mailing address of the International preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Mangin, S Telephone No. +31 70 340-1974



INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY

International application No.
PCT/CZ2004/000056

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - international search (under Rules 12.3 and 23.1(b))
 - publication of the international application (under Rule 12.4)
 - international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-12 as originally filed

Claims, Numbers

1-27 received on 11.07.2005 with letter of 08.07.2005

Drawings, Sheets

1/4-4/4 as originally filed

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. The amendments have resulted in the cancellation of:

- the description, pages
- the claims, Nos.
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages
- the claims, Nos. 1
- the drawings, sheets/figs
- the sequence listing (*specify*):
- any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/CZ2004/000056

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	2-9, 14-16, 22-24
	No: Claims	1, 10-13, 17-21, 25-27
Inventive step (IS)	Yes: Claims	
	No: Claims	1-27
Industrial applicability (IA)	Yes: Claims	1-27
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/CZ2004/000056

Re Item I

Basis of the report

The amendments filed with the letter dated 08.07.2005 introduce subject-matter which extends beyond the content of the application as filed, contrary to Article 34(2)(b) PCT. The amendments concerned are the following:

- In claim 1: "are over the entire width of the roll" and "of a width corresponding to the width of the roll of the charged electrode". No basis has been found in the original application.

- In claim 1: "part of the circumference is a two-dimensional spinning surface". (p. 10, I.23-24 of the description and figures 5b-5e can only be the basis for the following amendment: " the roll is on its circumference fitted with lugs and/or recesses".)

The above mentioned amendments will therefore not be taken into account for the evaluation of novelty and inventive-step.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D2: EP 1059106

D3: GB 1346231

1. Novelty - Art. 33(2) PCT

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 10-11, 13, 25-27 is not new in the sense of Article 33(2) PCT.

Document D2 (§18-§33, fig.1 and 5) discloses a method of making nanofibers from a polymer solution using electrostatic spinning in an electrostatic field created by a potential difference between a charge electrode and a counter electrode. The conducting polymer

solution is supplied into the electric field for spinning using the surface of the rotating charged electrode. The conducting polymer solution is drifted away to the counter electrode, the nanofibres are stored and form a layer.

The subject-matter of claims 1, 10-11, 13, 25-27 is therefore not novel over D2.

Document D3 discloses (col.2, l.53-col.3, l.38 and fig. 1 and 2) a method of making nanofibers from a polymer solution using electrostatic spinning in an electrostatic field created by a potential difference between a charge electrode and a counter electrode. The conducting polymer solution is supplied into the electric field for spinning using the surface of the roll rotating charged electrode. The conducting polymer solution is drifted away to the counter electrode, the nanofibres are stored on a conveyor belt permeable to air and form a layer. Additionally an air stream is created by the exhaust vent.

The subject-matter of claims 1, 10-13, 17-21, 25-26 is therefore not novel over D3.

2. Inventive Step - Art. 33(3) PCT

Dependent claims 2-9, 14-16, 22-24 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step.

Claims

1. A method of nanofibres production from a polymer solution (2) using electrostatic spinning in an electric field created by a potential difference between a charged electrode (30) and a counter electrode (40), in which the polymer solution (2) is for spinning into the electric field supplied by means of the surface of a rotating charged electrode (30) which is by a part of its surface immersed in a polymer solution, **characterized by that** the polymer solution (2) is supplied into the electric field for spinning using the surface of the rotating charged cylindrical electrode (30), which rotational axis is in the horizontal projection perpendicular to the movement direction of a device (7) for nanofibres storage, while on a part of the circumference of the charged electrode (30) near to the counter electrode (40) is a two-dimensional spinning surface (31) created, from which the nanofibres (8) formed by the action of the electric field from the conductive polymer solution (2) are over the entire width of the roll drifted towards the counter electrode (40) and in front of it they are stored on a device (7) for nanofibres storage and on the device they form a layer of a width corresponding to the width of the roll of the charged electrode, by means of which is a high spinning capacity reached.
2. A method as claimed in Claim 1, **characterized by that** an air stream acts on nanofibres (8) moving in the space between the charged electrode (30) and counter electrode (40) which supports drifting the nanofibres (8) out of the charged electrode (30).
3. A method as claimed in Claim 2, **characterized by that** the nanofibres (8) are by an air stream drifted towards the counter electrode (40) in front of which they are stored on the device (7) for nanofibres storage previous to air and form a layer on it.
4. A method as claimed in Claim 3, **characterized by that** the air stream is produced by sucking of the air from the space between the electrodes (30, 40) into the space behind the counter electrode (40).

5. A method as claimed in Claim 2, **characterized by** that the nanofibres are by the air stream deflected from their course towards the counter electrode (40) and they are led to the device (7) for nanofibres storage pervious to air, onto which surface they are stored in a layer in a space out of
5 reach of the electric field between the electrodes (30, 40) where they were produced.

6. A method as claimed in Claim 5, **characterized by** that the air stream is produced by sucking the air from the space between the electrodes (30, 40) into the space behind the device (7) for nanofibres storage pervious
10 to air in regard to the charged electrode (30).

7. A method as claimed in any of Claims 3 to 6, **characterized by** that into the space, where the nanofibres are being drifted, is an auxiliary drying air (9) supplied.

8. A method as claimed in Claim 7, **characterized by** that at least a
15 part of the auxiliary drying air (9) is drawn off the space, in regard to the charged electrode (30), in front of the device (7) for nanofibres storage pervious to air, without passing through this device (7).

9. A method as claimed in any of Claims 2 to 8, **characterized by** that at least the auxiliary drying air (9) is heated before entering the space where
20 the nanofibres (8) are being drifted.

10. A method as claimed in any of Claims 1 to 10, **characterized by** that the polymer solution (2) is composed of a water solution.

11. A device for nanofibres production from the polymer solution (2)
25 using electrostatic spinning in an electric field created by a potential difference between the charged electrode (30) and a counter electrode (40), while the charged electrode (30) is pivoted and immersed by a part of its circumference into a polymer solution (2), **characterized by** that the pivoted charged electrode (30) is cylindrical and its rotational axis is in the horizontal projection
30 perpendicular to the movement direction of the device (7) for nanofibres storage.

12. A device as claimed in Claim 11, **characterized by that** the counter electrode (40) surrounds a part of the free part of the circumference of the charged electrode (30) along its entire length.

5 13. A device as claimed in Claim 11 or 12, **characterized by that** there is the device (7) for nanofibres storage between both electrodes (30, 40) is situated.

10 14. A device as claimed in Claim 13, **characterized by that** the device (7) for nanofibres storage is pervious to air, while the space behind this device (7), in regard to the charged electrode (30), is connected to the vacuum source (6) serving to create an air stream directing out of the space between the electrodes (30, 40) towards this device (7).

15 15. A device as claimed in Claim 16, **characterized by that** the vacuum source (6) is connected with the space behind the counter electrode (40), in regard to the charged electrode (30), which is pervious to air.

20 16. A device as claimed in Claim 13, **characterized by that** outside the space between the electrodes (30, 40) is the device (7) for nanofibres storage pervious to air positioned, while the space behind this device (7), in regard to the charged electrode (30), is connected to the vacuum source (6) serving to create an air stream directing towards this device (7).

17. A device as claimed in any of Claims 12 to 16, **characterized by that** the device (7) for nanofibres storage is composed of a conveyor (71) pervious to air.

25 18. A device as claimed in any of Claims 12 to 16, **characterized by that** the device (7) for nanofibres storage is composed of a plane supporting material of the nanofibres (72).

19. A device as claimed in Claim 19, **characterized by that** the plane supporting material (72) is positioned on a conveyance (41).

30 20. A device as claimed in Claim 19, **characterized by that** the conveyance (41) is composed of a counter electrode (40).

21. A device as claimed in Claim 19, **characterized by** that the conveyance (41) is composed of stretching elements (42) of plane supporting material (72) of the nanofibres.

22. A device as claimed in any of Claims 14 to 21, **characterized by** 5 that into the space between the electrodes (30, 40) leads an inlet (90) of the auxiliary drying air (9).

23. A device as claimed in Claim 22, **characterized by** that in the inlet (90) of the auxiliary drying air (9) is an air heating device (91) positioned.

24. A device as claimed in Claim 22 or 23, **characterized by** that at 10 least a part of air is drawn off the space in front of the device (7), in regard to the charged electrode (30), for nanofibres storage, without passing through this device (7).

25. A device as claimed in any of Claims 11 to 24, **characterized by** that the charged electrode (30) is composed of an axially symmetric body, 15 where the axis is at the same time the axis of its rotation.

26. A device as claimed in Claim 25, **characterized by** that the charged electrode (30) is composed of a roll (3).

27. A device as claimed in Claim 26, **characterized by** that the roll (3) is on its circumference fitted with lugs (31) and/or recesses (32).